

able time, one normally treats it conservatively. However, if pain persists, fusion should be done, preferably through the paraspinal approach.

Another reason for fusing in the young child is increasing slip. A slip of 25 percent will just begin to show the typical spondylolisthesis build, a 50 percent slip will produce a cosmetically undesirable stature. With a good solid fusion the tight hamstrings will disappear in several months.

Removal of the loose element alone without fusion should never be done in children.

In adults, the vast majority with spondylolisthesis can be treated conservatively. There is an occasional patient who is brought to surgery because of persistent pain. One need never operate on an adult because of fear of increased slip. In the patient past 60 years old whose principal problem is sciatica, removal of the loose element alone without fusion offers a good chance for relief of pain. Younger people should have a one-level fifth lumbar, first sacral fusion, unless the fourth lumbar level is producing symptoms.

TYPE B—Elongation of the pars without separation. This type is treated the same as type A. Children with this condition are a little more likely to have neurological deficit. Usually only one side is involved in the neurological deficit and need be decompressed by nerve root decompression.

TYPE C—Aquisita. Extension of the fusion is only rarely necessary since most of the time patients with this condition can live with the lesion.

TYPE D—Pathological. No surgical treatment is necessary unless there is slip, in which case the treatment is the same as described for type A.

TYPE E—Acute fractures. These will usually heal if immobilized in a knee-to-nipple cast for about two months. To be sure that the case is acute, the defect must have the appearance of an acute fracture, and one of two things must be present: an x-ray film taken beforehand showing an intact pars, or healing of the pars with immobilization.

Degenerative Spondylolisthesis

The patient should be treated conservatively as long as possible and then decompression is indicated. Often it is not possible to decompress adequately without removing a large portion of the facets. Progression of slip will often occur in these cases. I have seen one case with 33 percent slip before surgery increase to 50 percent after surgery. Fusion should definitely not be done in

these older patients. For the occasional patient in his early 50's, a one-segment intertransverse fusion should be done after thorough decompression.

Congenital Spondylolisthesis

The treatment of congenital spondylolisthesis is very similar to that of isthmic spondylolisthesis types A and B. There is forward slip with an intact pars, usually due to insufficiency of the superior sacral facets.

Progressive slip is an indication for fusion. These children are much younger than children with the other types, often as young as 5 or 6 years old. A one-level fusion done through the paraspinal approach will stop further slip.

LEON L. WILTSE, MD

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The Critical Osseotendinous Junction

IN ATHLETICS in particular, and in certain physical fitness programs in general, the recent emphasis on recreational health, intensive conditioning programs, lengthened seasons for various sports, high level competition and extended athletic careers has increased tendon vulnerability, especially at the osseotendinous junction. Contrary to previous impressions, the area of origin or insertion of a tendon into bone may be involved to a lesser or greater extent. This results in a wide range of conditions: (1) discomfort after activity and no functional disability (phase 1), (2) discomfort during and after activity and no functional disability (phase 2), (3) discomfort during and after activity and significant functional disability (phase 3) and (4) discomfort all the time with significant functional disability or complete tendon rupture (phase 4). These various stages in the development of "tendinitis" have been seen in the swimmer's shoulder, tennis elbow, jumper's knee and achilles tendinitis.

Our incomplete understanding of the underlying pathology and our inability to effectively reverse this process with existing physical therapy modalities or anti-inflammatory medication or both represent basic defects in our approach to these

problems. An added factor of a controversial nature is the repeated injections of steroids into the affected area which may add to weakening of the tendon structure itself. Much research using electron microscopy, histochemical techniques and pharmacological studies needs to be done and may prove especially rewarding. The resort to surgical operation in phase 3 conditions and the development of chronic disability and catastrophic episodes in phase 4 conditions merely emphasize our frustration in dealing with these problems.

MARTIN E. BLAZINA, MD

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Ambulatory Treatment of Fractures

THE GREATEST SOURCE of disability associated with fractures of the long bones in the lower extremity is the prolonged period of time necessary for bone union to achieve sufficient strength to tolerate the normal stresses of function. An ideal of treatment would be to supply appropriate external support which can allow ambulatory function until sufficient maturation of endoskeletal healing structures has occurred.

The use of ambulatory casts to supply functional support during the healing phase of fracture care has an excellent record of safety and predictable success with 100 percent union rate in significant series of patients. Using these methods, one may expect an average healing time of approximately four months for the tibia and three months for the femoral shaft. The liability of this system, however, is its inability to achieve anatomic reduction and immediate stabilization as is feasible with internal fixation methods. On the other hand, skeletal structures are not excessively shielded from the stresses of function and maturation of bony callus can proceed in a most efficient manner.

The use of a cast brace which allows function at the knee by means of appropriate joints applied to the cast enhances the feasibility of early return to ambulatory function. In the case of a femur which has been maintained in skeletal traction until healing phase begins (one to three weeks), a total-contact plaster cast wrapped firmly and

tightly at the root of the leg can be applied in the operating room. Closed reduction under general anesthesia is feasible at this time, and appropriate alignment and length can be secured. The specialized cast brace joints may be applied at a later time as appropriate. A cast brace may also be used in conjunction with internal fixation which is of insufficient security to stand the full stresses of function. Using ambulatory casts, rapid mobilization of the patient is reasonable and discharge from acute hospital to home within several weeks of injury should be expected.

VERT MOONEY, MD

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High Velocity Directional Air Flow Systems (HVDAFS)

Status of "Clean Air Rooms"

THE PREVENTION of wound infection is vital to the success of any surgical procedure. This postoperative complication has been an especially tenacious obstacle to the patient and surgeon in achieving successful total joint replacement. Deep sepsis will usually require removal of the prosthetic device.

Among the factors to consider in attempting to effect some control of infection is that the operative and immediate postoperative wound provides an excellent locus for the development of infection; the incidence is also influenced by the number and virulence of organisms present, and the susceptibility of the host. Even the nonpathogenic lower virulence organisms can cause serious deep infections and subsequent prosthetic device removal.

Airborne bacteria are one source of wound contamination which can be controlled. Use of high velocity directional air flow systems (HVDAFS), "clean air" or "laminar flow" in the operating theater have effected a dramatic reduction of microorganisms in the operating room and lower wound contamination rates. Although reduction of airborne bacterial contamination is desirable, the relationship of this reduction to subsequent wound infection has not been definitely established.

The efficiency of these special air flow systems in reducing microorganisms present in the operating room must be placed in perspective with the